Goryunov, N.N.

(8)

31519
S/627/60/002/000/001/027
D299/D304

3.2410 (1559, 2205, 2705, 2805)

AUTHORS: Vernov, S. N., Khristiansen, G.B., Abrosimov, A. T., Goryunov, N. N., Dmitriyev, V. A., Kulikov, G. B., Nechin, Yu. A., Sokolov, S. P. (deceased), Solov'yeva, V. I., Solov'yev, K. I., Strugals'kiy, Z. S., and Khrenov, B. A.

TITLE: General description of the setup used for studying extensive air showers and the provisional results obtained

SOURCE: International Conference on Cosmic Radiation. Moscow, 1959. Trudy. v. 2. Shirokiye atmosfernyye livni i kaskadnyye protesessy, 5-16

TEXT: A complex experimental setup was installed at Moscow State University, consisting of a simultaneously operating physical apparatus plus the corresponding radiotechnical equipment and photographical recording devices. The setup incorporates over 5000 Geiger-Müller counters (forming a hodoscope), about 150 ionization

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General description of the setup...

chambers and a large diffusion chamber. The setup is designed for a comprehensive and simultaneous investigation of all the basic components (electrons and photons, nuclear-active particles and μ-mesons) of extensive air showers at sea level. The setup was designed in 2 different configurations: the first at the end of 1957, and the second at the beginning of 1959. Below, only the results obtained by means of the first setup are considered. The setup was located in a special building and in 10 mobile laboratories. The showers were registered by the system of hodoscoped counters. Part of the counters were shielded (those for detecting the nuclearactive particles and the μ-mesons) and the other counters were not shielded. The ionization chambers served to determine the lateral distribution of the electron-photon component and of the nuclearactive component. The microstructure of the electron component was studied by means of the diffusion chamber. Special measures were taken to ensure continuous and prolonged operation of the setup. The main units of the setup were automatically controlled, in particular the supply units and the photography system. The operation of the setup (as a whole) was controlled (triggered) by a selection system; in parti-

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General description of the setup ...

cular, the showers were selected in accordance with the density of the electron flow and of the μ-mesons. The setup was in operation for about 2500 hours, yielding a large amount of experimental data which are still being processed. The probability theory (Baye's theorem) was used for determining the (x,y)-axes and the number of particles N of the shower; in addition the distribution function f(r) as well as other distribution functions were determined (r denoting distance). The values of x, y and N were found by means of a special electronic simulator. The density distribution of electrons and mesons was determined by means of formula

$$W(\rho) = \prod_i \left[1 - \exp(-\rho\sigma_i)\right]^{m_i} \cdot \exp\left[-\rho\sigma_i(n_i - m_i)\right]$$

where m_i is the number of counters which operate over an area σ_i, and n_i - the overall number of such counters. The energy E of the electron-photon component was determined by means of ionization

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General description of the setup ...

chambers, shielded with lead (up to 6 cm thick). A very comprehensive picture of the particles and energies was obtained for showers whose axes fell within the system of 128 cubic detection chambers. The setup permits observing the central part of an atmospheric shower, whereby its several layers are simultaneously observed; this corresponds to the individual observation of the electron-photon, nuclearactive and μ-meson components. The processed material already yielded a fairly detailed picture of the structure of extensive air showers at sea level. Thus, the lateral distribution of particle flow in the individual showers was ascertained. It was found that the lateral distribution varies (in the ; to 25 m range) from shower to shower; the average distribution is, in the range of 5 cm to 100 m, as follows:

$$\rho(r) = \begin{cases} \dfrac{K_1 N}{r^{0,6}} & K_1 = 3,3 \cdot 10^{-3},\ 0,05 < r < 0,3 \text{ m} \\ & \end{cases}$$

(cont'd)

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General description of the setup ...

$$\left(\frac{K_2 N}{r} \cdot e^{-\frac{r}{60}} \right), \quad K_2 = 2 \cdot 10^{-3}, \quad 0{,}3 < r < 100 \text{ m}$$

The lateral distribution of the electron-photon components also fluctuates from shower to shower. At distances smaller than 1.5 m, these fluctuations are particularly sharp. The nuclearactive components also exhibits considerable energy fluctuations. The fluctuations in the high-energy μ-mesons were not yet analyzed. The energy of the electron-photon component E_{eph} was calculated for a shower with number of particles equal to $(2.7 \pm 0.2) \cdot N\beta$, where β is the critical energy for air (72 Mev). The above value was obtained with an accuracy of appr. 30%. It was found that the energy of the nuclearactive component $E_n \cong (0.5 \text{ to } 1.0) E_{eph}$. This value is, however, subject to considerable fluctuations and the experimental data are as yet insufficient to determine the contribution of the

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General description of the setup...

nuclearactive component in showers. In addition, the above-mentioned fluctuations severely delimit the choice of a theoretical model for the development of showers. Particular attention was devoted to the structure of the shower in the immediate vicinity of its axis, where the particles of highest (for the particular shower) energy should be concentrated. This led to the discovery of a new effect: Groups of particles (from 4 to 20) travel in narrow beams (not exceeding 8 cm in diameter) in the neighborhood of the axis (or along the axis itself), whereby their lateral distribution shows that the beams are not due to Poisson fluctuations. The new effect can be explained as follows: Either the beam is the core of a "young" electron-photon shower which originates from a high-energy π^0-meson at a certain distance from the apparatus, or the beam consists of μ-mesons. These two possibilities are discussed. The observed irregularity in the lateral distribution of μ-mesons in the vicinity of the shower axis might be related to the new effect. There are 6 figures and 2 tables.

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ASSOCIATION: Nauchno-issledovatl'skiy institut yadernoy fiziki MGU, Moskva (Scientific Research Institute of Nuclear Physics Moscow State University, Moscow)

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3 2410 (1559, 2705, 2805)

31521
S/627/60/002/000/003/027
D299/D304

AUTHORS: Goryunov, N. N., Yerlykin, A. D., Zatsepin, G. T., and Kamnev, A. B.

TITLE: Study of cores of individual air showers

SOURCE: International Conference on Cosmic Radiation. Moscow, 1959. Trudy. v. 2. Shirokiye atmosfernyye livni i kaskadnyye protsessy, 71-79

TEXT: The experimental setup is described; the results of the experiments are given. The principal apparatus consists of a system of ionization chambers which operated in conjunction with the complex setup of Moscow State University (see article on p. 5, same Trudy). The ionization chambers were disposed in two rows of 60, respectively 64 chambers each. The large number of chambers made it possible to obtain a continuous pattern of ionization distribution in space. The lower row was shielded by a triple layer Pb-C-Pb. The graphite layer acted like a converter of energy (of nuclearactive particles into electron-photon energy). The energy fraction

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Study of cores ...

imparted to π^0-mesons was estimated; it was found to be approx. 0.2 to 0.37. In processing the results, the main attention was devoted to the case when the shower axis passed through the ionization chamber system. According to cascade shower theory, the axis of high-energy showers can be localized in a small region. It was found that this holds also in practice. The position of the axis was determined by two independent methods, without any discrepancy. The showers recorded during a certain time interval were represented as a "point field", whose abscissas and ordinates give the total number of particles in the shower and the energy flux in the core, respectively. In order to ascertain the relationship between the number of particles N and the corresponding mean energy flux E, the various points were averaged. It was found that for $N = 10^5$, $E = 10^4$ relativistic particles. To one and the same intensity of shower there corresponds a whole range of values E, whereby the spread of the points increases with decreasing intensity of shower. The character of the ionization distribution in the vicinity of the shower core varies. In the majority of cases, the shower has an

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elementary structure, i.e. the ionization density has one sharp maximum. In some cases, a broadening of the core was observed; thus, out of 39 showers with N 10^5, one third belong to complex-structure showers. It was found that the ionization-density distribution can be expressed (in the majority of cases) by a power law of type $\rho(r) \sim 1/r^n$, up to $r \cong 1.5$ m and various n. The lateral distribution function of the energy flux of the nuclearactive component was constructed. The mean energy flux of the nuclearactive component was found to be $4.6 \cdot 10^3$ rel. particles = $2.3 \cdot 10^{12}$ ev. This was compared with the mean energy of the electron-photon component: $2.8 \cdot 10^4$ rel. particles = $2.8 \cdot 10^{12}$ ev. Integrating the lateral-distribution function of high-energy nuclearactive particles over a radius of 2.5 m about the axis, it was found that such a circle contains 0.9 particles with an energy $> 5 \cdot 10^{11}$ ev. (for showers with N = 10^5). Further, the energy spectra of nuclearactive particles in the central regions of showers of various intensity were con-

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Study of cores ...

sidered. Finally, the observed energy flux of the electron-photon component was compared with that calculated according to cascade theory. It was found that the calculated energy-flux exceeded the observed one by a factor of 3 (for r = 1.5 m), and by a factor of 8 (for r = 12 cm). There are 9 figures and 12 Soviet-bloc references.

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31526
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D299/D305

3,2410 (1559, 2205, 1705)

AUTHORS: Vernov, S. N., Goryunov, N. N., Dmitriyev, V. A., Kulikov, G. V., Nechin, Yu. A., Solov"yeva, V. I., Strugal'skiy, Z.S., and Khristiansen, G. B.

TITLE: Study of lateral-distribution function of charged particles and of the energy density of the electron-photon component of extensive air showers

SOURCE: International Conference on Cosmic Radiation. Moscow, 1959. Trudy. v. 2. Shirokiye atmosfernyye livni i kaskadnyye protsessy, 117-122

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TEXT: The data obtained by means of the diffusion chamber and the hodoscoped counters permit determining the particle distribution in the neighborhood of the shower axis as well as at large distances from it. These data can be used for determining the number of particles and the position of the axis to an accuracy of approximately 1 m by means of the hodoscoped counters, and to an accuracy of several centimeters if the axis lies within the limits of the diffu-

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Study of lateral-distribution ...

sion chamber. The electron-photon component at large distances from the axis was studied by means of large ionization chambers, shielded with lead. During 1000 hours of operation, 28 cases were recorded of the axis (of showers with number of particles $N \geqslant 10^5$) passing through the core detector. All these showers were investigated in detail with respect to distribution and energy of particles. The cases most favorable for analysis are those, in which the shower axis lies in the diffusion chamber. In all, 7 such cases were recorded. For each of these showers, the lateral-distribution function of particle density was constructed for distances ranging from 5 cm to 1 m from the shower axis. It was found that the form of the distribution function varied from shower to shower in the core region. In that region, a peculiar feature of particle distribution was observed, namely a narrow beam (4 cm in diameter) of particles, consisting of a large number (4 to 15) of particles with collinear tracks. From data obtained by means of the hodoscoped counters and knowing the position of the shower axis, it is possible to construct the distribution function of charged particles up to a distance of r = 25 m. from the axis, for each individual

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Study of lateral-distribution ...

shower. Then the experimental distribution functions were compared with the theoretical functions of Nishimura and Kamata. The results of the comparison are shown in a table. A difference was noted in the form of the distribution of the energy flux of the electron-photon component in the individual shower at a distance of $r \sim 1$ m, and at large distances from the axis; this is due to local fluctuations in the form of the energy distribution in the core. In each of the investigated showers, the energy flux of the electron-photon component was found within a radius of 25 m; it turned out that the electron-photon component energy-flux was stronger (on the average) in showers with small s, than in showers with large s (s being the "age parameter"). The system of counters permitted recording showers with number of particles $N = 10^4$ to 10^7. The data yielded by the diffusion chamber were used for constructing the distribution function for distances $r < 1$ m from the shower axis. The conclusion was reached that the form of the electron-photon energy distribution-function does not depend on the number of particles in the shower. Therefore, all the data were referred to a shower with same N, and the average energy-density distribu-

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Study of lateral-distribution ...

tion constructed. Approximating this distribution by a power law of type r^{-n}, one obtains for the exponent n the following values (as a function of the distance r from the axis):

$n = 1,2 \pm 0,2, \quad 0,1 < r < 1$ m

$n = 1,5 \pm 0,2, \quad 1 < r < 10$ m

$n = 2,0 \pm 0,3, \quad 10 < r < 60$ m

$n = 2,6 \pm 0,2, \quad 60 < r < 1000$ m

Further, the mean energy per electron was obtained from experimental and theoretical values (based on the cascade shower theory) of the mean energy as a function of r showed a discrepancy which can be removed by taking into account the effect of nuclear scattering. The experimental values permit calculating the energy of the

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Study of the lateral-distribution ...

electron-photon component, viz. $E_{eph} = 2.5 \beta N$, where β denotes the mean energy loss per unit of depth t. There are 2 figures, 1 table and 6 references: 5 Soviet-bloc and 1 non-Soviet-bloc. The reference to the English-language publication reads as follows: J. Nishimura, K. Kamata. Suppl. Theor. Phys., no. 6, 1958.

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31527
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D299/D305

3,2410(1559, 2705, 2805)

AUTHORS: Vernov, S. N., Goryunov, N. N., Dmitriyev, V. A., Kulikov, G. V., Nechin, Yu. A., and Khristiansen, G. B.

TITLE: Study of high-energy nuclearactive component of extensive air showers at sea level

SOURCE: International Conference on Cosmic Radiation. Moscow, 1959, Trudy. v. 2. Shirokiye atmosfernyye livni i kaskadnyye protsessy, 123-131

TEXT: The high-energy nuclearactive component was studied by the apparatus of Moscow State University. The nuclearactive component was detected and measured by means of hodoscoped counters and ionization chambers. The processed hodoscope data permitted determining the total number of particles N and the distance R_i of the shower axis from the ionization chambers. Part of the data were processed by the electronic computer of Moscow State University; thereby the number of particles was determined to an accuracy of approximately

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Study of high-energy ...

20%, and the position of the axis to within 0.25 m, provided it fell inside the area of a detector of 4 m^2. The joint processing of the data of the hodoscope and ionization chambers yielded the mean energy of the nuclearactive component of showers of various number of particles, the energy spectra of the nuclearactive particles in the central part of the shower, the lateral distribution of the energy flux carried by the nuclearactive component in the central part of the shower and the lateral distribution of the nuclearactive particles. Showers, whose axes were at a distance of less than 10 m from the detector of nuclearactive particles, were selected for further study. These showers were divided into 4 groups according to number of particles; over 1000 such showers were investigated. The integral spectra of nuclearactive particles of energies $E_{na} \leqslant 10^{12}$ ev. were obtained for the 4 groups. The integral spectra of nuclearactive particles, averaged over the showers of all the groups, can be approximated by an exponential function with exponent $\gamma = -1.0 \pm 0.2$. For showers with large N (group 4), the value of γ shows a decreasing tendency. The space distribution of the energy flux near the

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Study of high-energy ...

axis can be approximated by an exponential function with exponent $n = -1.5 + 0.2$. A typical correlation was established between the electron-photon and the nuclearactive components of cores of the individual showers, namely showers with an electron-photon component of an energy much higher than the average, have (as a rule) a nuclearactive component of lesser energy. The converse was also observed. The measurements gave direct evidence of the presence of nuclearactive particles of high-energy ($\sim 10^{12}$ ev.) in showers at sea level, and of the considerable importance of the nuclearactive component in the energy balance of the shower. The nuclearactive component in the central part of the shower carries an energy which is (on the average) almost as large as the entire energy of the electron-photon component at the level of observation. The presence of considerable energy in the nuclearactive component affects the absorption of particles in the shower. The development of individual showers can differ considerably, as the magnitude of the energy of the nuclearactive component differs considerably in the individual showers. The main contribution to the energy flux carried by the nu-

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Study of high-energy ...

clearactive component within a circle of given radius is made by high-energy particles, whose lateral distribution is such that, on the average, all the particles with energy $\geq 10^{12}$ ev. are contained in a circle of radius r = 1 m. The distribution of the energy flux carried by the nuclearactive component showed that this flux is fairly widely distributed. Further, the transverse momentum imparted to the particles (during their generation), was estimated. The nuclearactive component of showers with $N = 10^4$ to 10^6 at sea level carries an energy of 0.5 to 1.0 of the total energy, carried by the electron-photon component. As a result of the energy fluctuations of the nuclearactive component in the individual showers, the development of the showers fluctuates, too. The distribution of the energy flux of the nuclearactive component over a region of $1 \leq r < 20$ m near the axis is described by the law $r^{-2\pm0.25}$; such a distribution should affect the characteristics of the soft component. There are 4 figures, 1 table and 10 references: 9 Soviet-bloc and 1 non-Soviet-bloc. The reference to the English-language publication reads as follows: J. Nishimura, K. Kamanta.Suppl. Prog.Phys.,no.6, 1958.

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05447
SOV/120-59-3-18/46

AUTHOR: Goryunov, N. N.

TITLE: A 128-Channel Recorder for use With Ionization Chambers (Registriruyushcheye ustroystvo dlya ionizatsionnykh kamer na 128 kanalov)

PERIODICAL: Pribory i tekhnika eksperimenta, 1959, Nr 3, pp 84-89 (USSR)

ABSTRACT: Each channel in the apparatus has its own ionization chamber; the apparatus is meant for use with extensive air showers. Each chamber is a cube of side 25 cm; the collector in each is a cylinder 10 mm in diameter and 100 mm long. The gas (98% A, 2% N) is at a pressure of 830 mm Hg. The electron collection time is about 20 μsec. The dynamic range of the non-linear (logarithmic) amplifiers coupled to the chambers is 8000:1. Fig 1 shows the block diagram, in which units 1 - 6 are duplicated 128 times. 1 is the ionization chamber, 2 is a head amplifier, 3 is the main (non-linear) amplifier, 4 is a gate, 5 is a store, and 6 is an electronic switch, 7 is an amplifier, 9 is a photographic recorder, 10 is a summing circuit fed by all 128 channels,

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A 128-Channel Recorder for use With Ionization Chambers

11 is an anticoincidence unit, 12 is a noise-source amplifier, 13 is a gating-pulse generator, 14 is a control-pulse generator for the electronic switches, 15 is a beam-brightener and sweep unit, 16 is an amplifier, and 17 is a blocking circuit. Fig 2 shows the head amplifier (top half), with the non-linear amplifier, coincidence circuit, store, and electronic switch. (The noise-source amplifier has an aerial, which picks up any local electrical interference; the blocking circuit prevents the interferring pulses from being recorded). Fig 3 shows the amplitude response curve for the channels (input horizontal). Fig 4 shows the circuit of unit 14; there are two oscilloscopes, one for each set of 64 channels, and each set of 64 is divided into 4 blocks of 16. The four blocks are connected in turn to the circuit of Fig 4, in which the three half-valves shown on the top left are duplicated 16 times. The outputs to the summing unit are summed and, if the sum exceeds some set value, the gates 4 are opened. The pulses are then presented on the

Card 2/3 oscilloscopes in the form shown in Fig 5. Fig 6 shows

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A 128-Channel Recorder for use With Ionization Chambers

a noise source (blocking oscillator) used to detect noise-sensitive spots in the apparatus. Fig 7 is a very poor general view of some of the apparatus. There are 7 figures and 4 Soviet references.

ASSOCIATION: Nauchno-issledovatel'skiy institut yadernoy fiziki MGU (Nuclear Physics Research Institute of Moscow State University)

SUBMITTED: April 10, 1958

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-21(7)

SOV/56-36-3-4/71

AUTHORS: Vernov, S. N., Goryunov, N. N., Zatsepin, G. T., Kulikov, G.V., Nechin, Yu. A., Strugal'skiy, Z. S., Khristiansen, G. B.

TITLE: Investigation of the Core of Extensive Atmospheric Showers (Issledovaniye stvola shirokogo atmosfernogo livnya)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 36, Nr 3, pp 669-681 (USSR)

ABSTRACT: The group of research scientists followed a suggestion made by D. V. Skobel'tsyn to investigate the passage of extensive atmospheric showers through matter simultaneously in different depths; in this connection an investigation of the shower core was carried out. Figure 1 shows a block scheme of the experimental arrangement used, which furnished data concerning the electron-photon and the nuclear-active components of the shower core. The experimental system consisted essentially of a diffusion chamber (0.64 m^2), 124 ionization chambers in hodoscope-connection, special filters and 672 Geiger-Mueller (Geyger, Myuller) hodoscope counters of different sizes. The method, which is described as new, is described in detail,

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and the possibilities it offers are discussed. The entire device remained in operation for 1300 hours and recorded more than 10,000 passages of extensive air showers. Within 1,000 hours 28 passages of shower cores with a shower particle number of $N > 10^5$ through the first row of ionization chambers were recorded. Figure 4 shows a photograph of the diffusion chamber for such a passage and the corresponding pulse oscillogram of 64 ionization chambers. The article gives numerous individual data concerning different showers as e.g. the ionization distribution in the 64 ionization chambers of the first and second row respectively for $N = 5.10^5$, $1.3.10^5$ and $N \approx 10^5$ with a spatial distribution of energy flux $\sim 1/r^3$ (Fig 6). Figure 8 shows the same, expressed by the number of relativistic particles passing through the ionization chambers of the first and second row for $N = 10^4$ and 2.10^4 and an energy flux $\sim 1/r^2$ and $\sim 1/r$. Figures 6 and 8 show the particle flux distribution in the diffusion chamber for $N = 2.10^6$ and $3.5.10^4$ respectively. In extensive air

showers with $N > 10^5$ it was observed in the shower core ($r < 1m$) that the total energy of nuclear-active particles is of the order of the energy of the electron-photon component at the same distance from the axis; for individual showers, however, the ratio of these energies showed different values. The energy current density of the electron-photon component shows an increase of up to $r = 20 \div 30$ cm from the shower axis; the course of energy flux density in dependence on r cannot be represented by a general formula. It fluctuates between $\sim 1/r$ and $\sim 1/r^3$. The energy fluxes of electron-photon and nuclear-active components of the shower core show considerable fluctuations (up to 10 times). The authors finally thank Academician D. V. Skobel'tsyn for his help and interest, V. V. Borisoglebskiy for his collaboration, Professor N. A. Dobrotin for his help and discussions, and further also a group of collaborators of the MGU: A. T. Abrosimov, S. S. Glagolevskiy, B. V. Subbotin, A. D. Yerlykin, A. B. Kamnev, E. N. Sosnov for their help in carrying out experiments. There are 8 figures, 2 tables, and 12 references, 11 of which are Soviet.

SOV/56-36-3-4/71

Investigation of the Core of Extensive Atmospheric Showers

ASSOCIATION: Moskovskiy gosudarstvennyy universitet
(Moscow State University)
Fizicheskiy institut im. P. N. Lebedeva Akademii nauk SSSR
(Physics Institute imeni P. N. Lebedev of the Academy of Sciences, USSR)

SUBMITTED: July 21, 1958

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21(1)

SOV/56-36-4-2/70

AUTHORS: Vernov, S. N., Babetskiy, Ya. S., Goryunov, N. N., Kulikov, G. V., Nechin, Yu. A., Strugal'skiy, Z. S., Khristiansen, G. B.

TITLE: On the Structure of the Core and the Central Regions of Extensive Atmospheric Showers at Sea Level (O strukture stvola i tsentral'nykh oblastey shirokikh atmosfernykh livney na urovne morya)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 36, Nr 4, pp 976-984 (USSR)

ABSTRACT: The object of the present paper was an experimental investigation of the spatial distribution of the energy flux of the electron-photon and the nuclear-active component in the core and the central regions of extensive air showers; the present paper is a continuation of an article published in the preceding issue of this periodical (Ref 1), in which the method and the experimental arrangement were already described. Figure 1 is a schematical representation of the chamber system with the distribution of hodoscope counters. The counters were located in groups of 12 and 24 in containers. The ionization chambers had a total area of 4 m^2. In the course of the 1800 hours during which the apparatus was in operation, about 18000

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showers were recorded, with particle numbers of between 10^3 and 10^6, and axes which were at a distance of up to 30 m from the system of ionization chambers. From the manifold material obtained by these investigations the spatial distribution obtained for individual showers or groups of showers (classification according to particle number N) are analyzed. For spatial particle flux density it holds that $\varrho(r) \approx 2.10^{-3} N/r$ for $r < 10$ m, for the energy flux density: $\varrho_E(r) \sim r^{-n}$. For shower groups of different sizes (ΔN from $1.0.10^5$ - $5.0.10^5$ up to 5.10^3 - 5.10^5) table 1 shows how many of the total of 82 investigated showers correspond to certain n-values (from < 0.8 to 3.2 - 3.4). Figure 2 (a,b) shows the spatial distribution of the energy flux of electron-photon and nuclear-active components of two different shower groups, figure 3 shows the energy spectrum of the nuclear-active component in the shower cores, and figure 4 shows the distribution of the absolute values of the energy flux of the electron-photon component in a circle with the radius 1.5 m round the axis of a shower with $\bar{N} = 10^5$ particles. The diagram is characteristic of the strong oscillations ob-

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served. Figure 5 finally shows the spatial energy flux distribution within the range of from 0.1 to 30 m; the measured values (in a semilogarithmic diagram) are practically on a steeply declining straight line. Thus, the following is obtained for the electron-photon component:

$$\varrho_{e\text{-}ph} \sim 1/r^{1.35} \quad \text{at} \quad 0.1\ m < r < 2.0\ m$$

$$\varrho_{e\text{-}ph} \sim 1/r^{2} \quad \text{at} \quad 2.0\ m < r < 30\ m$$

and for the nuclear-active component: $\varrho_{n\text{-}a} \sim 1/r^2$ at $0.2m < r < 30m$.

Figure 6 again shows the spatial distribution of the absolute values of energy flux in a distance of 10 m from the shower core; like within the range of the core itself, oscillations are considerable. The authors finally thank G. T.Zatsepin and I. P. Ivanenko for advice and discussions. There are 6 figures, 3 tables, and 3 Soviet references.

ASSOCIATION: Institut yadernoy fiziki Moskovskogo gosudarstvennogo universiteta (Institute for Nuclear Physics of Moscow State University)

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24.6810

82887
S/120/60/000/02/018/052
E192/E382

AUTHORS: Rapoport, I.D. and Goryunov, N.N.

TITLE: A Hodoscope Based on Semiconductors

PERIODICAL: Pribory i tekhnika eksperimenta, 1960, No 2, pp 72 - 74 (USSR)

ABSTRACT: A detailed circuit diagram of the equipment is shown in Figure 1. All the transistors in this device are Soviet-made, type P 13B, while the diodes are of the type D1B. The upper portion of the circuit elements in the figure consists of 25 transistorized gated units; the middle portion contains 25 bistable trigger circuits, while the lower portion contains a univibrator and a blocking oscillator. The bistable circuits are the basic units of the system. The transition of a bistable circuit from the first state of equilibrium into the second steady state is effected by a voltage pulse from a corresponding counter C. The circuit remains in the second steady state till the instant of reading the state of the bistable circuits; it acts therefore as a memory device containing the information relating to a given hodoscopic number. The negative pulses from the counters C are

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applied to the collector circuits of the gated input units. These pulses are almost fully suppressed, if the gating signal Y is absent. When the positive pulse Y is applied, the circuit is unblocked and thus the pulses from C can actuate the bistable circuits. The resolving time for the coincidences between C and Y pulses is of the order of 5 μs. The system operates satisfactorily if the amplitudes of the counter pulses are about 2.5 V and those of the gating pulses are about 0.5 V. The process of signal transmission is initiated by a starting pulse P (Figure 1). This signal actuates a univibrator and opens a blocking oscillator which starts generating a train of positive pulses having an amplitude of 4 V and a duration of 7 μs. The pulses are repeated at intervals of 200 μs. These pulses are applied to the input circuits of all the bistable circuits by means of the diodes (Figure 1). The first pulse returns all the bistable triggers to their original steady state. Consequently, the collectors of these circuits

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E192/E382

A Hodoscope Based on Semiconductors

produce transients which actuate the neighbouring trigger circuits. In this way successive resetting pulses from the blocking oscillator produce a shifting of the information stored in the trigger circuits. As a result of this operation positive pulses are produced at the output of the last bistable trigger. The hodoscopic channels are arranged in groups of 25, each group being provided with its own blocking oscillator. The output signals of each group are applied to a common output circuit. The blocking oscillator produces 30 pulses, since the monostable multivibrator returns to its steady state after the interval corresponding to 30 periods of the blocking oscillator. There are 1 figure and 5 referemces, 1 of which is English and 4 are Soviet.

ASSOCIATION: Nauchno-issledovatel'skiy institut yadernoy fiziki MGU (Scientific-Research Institute for Nuclear Physics of MGU)

SUBMITTED: March 16, 1959

Card 3/3

VERNOV, S.N.; GORYUNOV, N.N.; DMITRIYEV, V.A.; KULIKOV,G.V.; NECHIN, Yu.A.; KHRISTIANSEN, G.B.

Function of the spatial distribution of a flux of charged particles in an individual extensive air shower. Zhur. eksp. i teor. fiz. 38 no.1:297-298 Jan '60. (MIRA 14:9)

1. Institut yadernoy fiziki Moskovskogo gosudarstvennogo universiteta.

(Cosmic rays)

83174

S/056/60/039/002/011/044
B006/B056

24.6900

AUTHORS: Goryunov, N. N., Zatsepin, G. T.

TITLE: Observation of μ-Meson Bursts in a System of Ionization Chambers

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960, Vol. 39, No. 2(8), pp. 271 - 275

TEXT: The device by means of which the investigations described here were carried out, consisted of two layers of cubic ionization chambers (cf. Fig. 1). The chambers were close together and covered a square area of 4 m^2. Each layer consisted of 64 chambers. Besides this device, a large number of Geiger-Müller counters, arranged in groups at different distances from the chamber system, were used for recording muon bursts. Fig. 2 shows examples of ionization distributions in the layer of ionization chambers during the recording of inclined muon showers. The results obtained were evaluated from the following viewpoints: 1) Ionization is concentrated only in one of the rows of chambers, and its total

Card 1/3

amount corresponds to the passage of more than 1,000 relativistic particles. 2) There must be at least four chambers in a straight line, in which ionizations should not differ by more than one and a half times their amount. The number of events selected in this manner amounted to 0.25 ± 0.03 per hour in each row of chambers. A total of 190 events were recorded in both rows. Fig. 3 shows the integral shower spectra (1 - according to the number of relativistic particles in the shower, 2 - according to the total ionization). For constructing the curves, the data obtained in 370 hours of operation of the device were used, assuming that the total number of muon showers of a given number of particles passing through the device exceeded the number measured in the selected angular interval by more than twenty times its amount. For the bursts due to high-energy muons ($E \geq 10^{11}$ ev) inciding upon the horizontal line at equal angles ($\leq 15^{\circ}$) it holds that the number of showers decreases with the number of particles n as $1/n^2$ or even more steeply. The experiments showed that by means of the system of ionization chambers used by the authors, it is possible to measure not only the number of particles of showers produced by muons, but also to investigate the

83174

Observation of μ-Meson Bursts in a System of Ionization Chambers

S/056/60/039/002/011/044
B006/B056

angular distributions of high-energy muons. There are 3 figures and 5 references: 4 Soviet and 1 US.

SUBMITTED: March 26, 1960

Card 3/3

GORYUNOV, N.N., ZATSEPIN, G.T., DEDENKO, L.G.,

"Development of Air Showers and Nature of Primary Component at High Energies, "

report presented at the Intl. Conference on Cosmic Rays and Earth Storms, Kyoto, Japan, 4-15 Sept 1961.

33143
S/120/61/000/006/009/041
E039/E485

21.6000
AUTHORS: Goryunov, N.N., Rapoport, I.D.

TITLE: A hodoscope system using magnetic elements

PERIODICAL: Pribory i tekhnika eksperimenta, no.6, 1961, 59-61

TEXT: A hodoscope system is described which uses ferrite-transistor elements and hence is small and light with a low energy consumption. It is designed for use with a very large number of Geiger counters (10^3 to 10^4). The circuit shown in the figure is one section of the apparatus which operates with 20 channels. There are two basic processes: the recording and subsequent reading of the hodoscope signals. The record is produced on toroidal ferrite cores which have a rectangular hysteresis loop. The speed of the system is determined by the maximum permissible rate of reading and is limited by the time constant of the circuits coupling the cores. At L_i = 100 μh, C_i = 0.02 μf, the permissible reading frequency is about 50 kc. It is practicable to vary the values of L_i and C_i in the circuit, with the given triodes and cores, to bring the frequency up to about 100 kc. The construction is economical; it is claimed to require only half the number of components per

Card 1/2

34352
S/203/61/001/006/004/021
D055/D113

9.6150

AUTHORS: Vakulov, P.V.; Goryunov, N.N.; Logachev, Yu.I., and Sosnovets, E.N.

TITLE: Radiation registered during the flights of Soviet artificial satellites and space rockets

PERIODICAL: Geomagnetizm i aeronomiya, v.1., no.6, 1961, 880-887

TEXT: Methods of registering radiation, based on the use of scintillation and gas-discharge counters and applied in Soviet artificial satellites and space rockets, are described. The registration of weak currents (up to 10^{-10} a) with the aid of a relaxation oscillator on a neon tube is described. The scintillation counters measured the number of particles releasing more energy in the crystal than that determined by the thresholds of the counting devices. Ionization caused by radiation in the entire crystal was also measured. The gas-discharge counters registered charged particles and γ-radiation to an accuracy of $\sim$ 1%. The counters were located behind screens of various materials to facilitate the analysis of radiation according to

Card 1/3

Radiation registered ...

penetration. The devices with the counters were located both inside and outside the container with scientific apparatus. For economy the photomultipliers in the counters were fed without a divider by leads from a high-voltage battery direct to the electrodes. Ionization was determined from the currents of the anode and seventh dynode. By using two channels, these currents could be compared in order to estimate how much of the energy produced in the crystal resulted from saturation of the anode current during intense scintillation in the crystal. By this means comparatively high-energy particles could be detected in the inner zone during tests with the third artificial Earth satellite. The use of a single scintillation counter to measure many parameters permitted the weight and size of the device to be reduced but required careful selection of photomultipliers, which had to satisfy the following requirements: (1) there must not be more than one sound impulse per 10 sec. corresponding to energy liberation of above 30 kev in an NaJ(Tl) crystal and there must be practically no impulses corresponding to energy liberation of > 300 kev; (2) leakage current of the seventh dynode $\leq 1 \cdot 10^{-10}$ a; (3) anode dark current $\leq 1 \cdot 10^{-8}$ a; (4) leakage current of the other dynodes of the intervals $\leq 1 \cdot 10^{-7}$ a. The ETC-5(STS-5)

Card 2/3

S/203/61/001/006/004/021
D055/D113

Radiation registered ...

gas-discharge counters used were small and had a low operating voltage (~ 400 v) and a thin wall, which facilitated the recording of low-energy particles. The electronic circuits operating on semi-conductor elements and the calibration method are described in detail. There are 9 figures and 5 Soviet references.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M.V. Lomonosova. Institut yadernoy fiziki (Moscow State University imeni M.V. Lomonosov. Institute of Nuclear Physics).

SUBMITTED: October 12, 1961

Card 3/3

S/043/62/026/005/020/022
B108/B102

3.2410

AUTHORS: Goryunov, N. N., Dedenko, L. G., and Zatsepin, G. T.

TITLE: Nature of the primary component of cosmic radiation in the high-energy range and extensive atmospheric showers

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya fizicheskaya, v. 26, no. 5, 1962, 685 - 688

TEXT: It is concluded from experimental evidence that at primary particle energies above $3 \cdot 10^{15}$ ev the exponent of the shower spectrum changes considerably, viz., from 1.7 at low energies ($< 3 \cdot 10^{15}$ ev) to 2.2. at high energies. This may be due either to a change in the exponent of the source spectrum, or to a decrease in the accumulation factor from a certain magnetic hardness onward, which might be caused by high-energy particles elapsing from our Galaxy. Showers induced by heavy nuclei exhibit less fluctuations in their characteristics than do proton-induced showers, and have an unusually high muon component. The characteristics of showers with

Card 1/2

a great number of particles vary less than do those of showers involving fewer particles. The decrease in fluctuations observed at a higher exponent in the spectral law indicates that heavy nuclei are the predominant primary component at high energies. There are 2 figures.

Card 2/2

BOGOLYUBOV, V.Ye., doktor tekhn. nauk, prof. (Moskva); GORYUNOV, N.N., kand. tekhn. nauk (Moskva); VERSHIN, V.Ye., inzh. (Moskva)

Calculation of a nonsteady process in a simple circuit containing a p-n junction. Elektrichestvo no.10:1-3 O '64. (MIRA 17:12)

VINOKUROV, Iosif Abovich; GORYUNOV, Nikolay Nikolayevich, kand. fiz.-mat. nauk; KLEYMAN, Arkadiy Yur'yevich; SOLOVOV, Aleksandr Alekseyevich; YENYUTIN, V.V., red.

[Handbook on semiconductor diodes and transistors] Spravochnik po poluprovodnikovym diodam i tranzistoram. Moskva, Energiia, 1964. 526 p. (MIRA 18:1)

L 29971-65 EWT(d)/FSF(h)/FSS-2/EWT(1)/EEC(m)/FS(v)-3/EEC(k)-2/EWG(s)-2/EWG(v)/
FCC/EWA(d)/EEC-4/EEC(t)/EEC(c)-2/EWA(h) Pn-4/Po-4/Pe-5/Pq-4/Pac-4, Pg-4/P1-4/
Pk-4/P1-4/Pae-2/Peb AST/TT/GW-2/RS

ACCESSION NR: AP5005447 S/0293/65/003/001/0172/0174

AUTHOR: Goryunov, N. N.; Savin, B. I.; Sosnovets, E. N.

TITLE: Transistorized electrometric amplifier for measuring weak currents from charged-particle detectors

SOURCE: Kosmicheskiye issledovaniya, v. 3, no. 1, 1965, 172-174

TOPIC TAGS: transistorized amplifier, electrometric amplifier, charged particle detector, weak current measurement, atmospheric radiation detection, Cosmos 12, Cosmos 15

ABSTRACT: A transistorized amplifier for measuring weak currents ($< 10^{-7}$ amp) is described, in which the conversion of dc into voltage pulses proportional in amplitude to the current is realized by means of a capacitor and a relay. The device permits digital registration of the measured current and by virtue of its compact size is a useful component in space probes. Since it is virtually insensitive to the polarity of the measured current, it can be used with either electron or positive-ion detectors. The circuit contains four amplification stages and a nonlinear negative feedback circuit which increases the gain by a factor of 10. For registering widely varying current, several individual amplifiers can be used. Three of

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L 29971-65

ACCESSION NR: AP5005447

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the amplifiers were used to measure weak current in the charged-particle collectors of the electrostatic analyzers aboard Cosmos-12 and Cosmos-15. The total dynamic range of the circuit was 1000; the maximum number of pulses in a sequence was 40. Threshold sensitivity of the first amplifier was 10 mv. Threshold current was [illegible] amp. Intensity was 6 x 10[illegible] $1/E_0$ part/cm²/sec·kev where E_0 is the particle energy in kev to which the analyzer is adjusted. Orig. art. has:

[illegible]

ASSOCIATION: none

SUBMITTED: 18Apr64 ENCL: 00 SUB CODE: MC, NP

NO REF SOV: 000 OTHER: 000 ATD PRESS: 3196

Card 2/2

L 36967-65 EWT(1)/EWT(m)/EWA(h) Peb IJP(c)
ACCESSION NR: AP5007032 S/0120/65/000/001/0090/0094

AUTHOR: Goryunov, N. N.; Yerlykin, A. D.

TITLE: Wide-range discrete height-time converter

SOURCE: Pribory i tekhnika eksperimenta, no. 1, 1965, 90-94

TOPIC TAGS: pulse height analyzer, pulse ionization chamber

ABSTRACT: The RC-circuit structures used in logarithmic pulse-height-time converters with a wide dynamic range of input-pulse heights are considered. The chief drawback of the nonlinear height-time conversion systems suggested by M. F. Crouch et al. (INSJ, 1958, 8) and K.Suga et al. (Rev. Sc. Instr., 32, no. 11, 1187) is seen in the fact that they require a rigidly stabilized amplifier gain and discriminator threshold. A simpler system free from these limitations and suitable for operation with a pulse ionization chamber is suggested in the present article. This system has a dynamic range of 2000. The error of pulse-

Card 1/2

L 36967-65
ACCESSION NR: AP5007032

height determination is 10% in the 300 range and 20% or better for wider ranges. The system uses a cascade amplifier with a gain of 2600 and a band of 0.1 cps — 40 kc. The converter was tested in conjunction with a 100-pf ionization chamber with a pulse-rise time of 16 usec. Orig. art. has: 4 figures and 14 formulas. [03]

ASSOCIATION: Fizicheskiy institut AN SSSR (Institute of Physics, AN SSSR)

SUBMITTED: 19Dec63 ENCL: 00 SUB CODE: EC, EM

NO REF SOV: 003 OTHER: 002 ATD PRESS: 3221

Card 2/2

L 60837-65 EWT(m)/EWP(t)/EWP(b) IJP(c) JD

ACCESSION NR: AP5017670 UR/0109/65/010/007/1325/1327

539.293.011.43

22

AUTHOR: Goryunov, N. N.; Ovechkin, Yu. A.; Savchenko, A. M.; Stankova, A. V.; Tolkacheva, Ya. A.; Feoktistov, Yu. F. B

TITLE: Investigation of secondary punch-through in transistors

SOURCE: Radiotekhnika i elektronika, v. 10, no. 7, 1965, 1325-1327

TOPIC TAGS: transistor punch through, secondary punch through, transistor breakdown, alloy transistor, diffusion alloy transistor, germanium transistor/P16 transistor, P416 transistor

ABSTRACT: The phenomenon of secondary punch-through was investigated in alloy germanium transistors and diffusion-alloy germanium transistors. The transistors were altered to impair heat transfer from the collector junctions in order to aid the development of secondary punch-through. A rectangular current pulse with a height of 0.05—1.0 amp and a duration of 0.1—1.5 msec was fed through the transistors. The base terminal was not connected in the circuit, and the voltage between the collector and emitter was observed with an oscillograph. In a majority of the transistors tested, a sudden drop in voltage occurred at the instant of secondary punch-

Card 1/2

L 60837-65

ACCESSION NR: AP5017670 O

through 5—20 μsec after the start of the current pulse. In some of the specimens, the voltage drop occurred twice, with collector-emitter voltage dropping to 8—30 v and then to 2—5 v. The first drop corresponded to the development of secondary punch-through; the second was ascribed to "tertiary" punch-through which is the result of the sequential formation of two or more channels of local heat breakdown similar to the sequential "igniting" of microplasma regions during the breakdown of nonhomogeneous junctions. The effect of a 15-koe magnetic field on the development of secondary punch-through was also studied. It was found that the delay time in alloy transistors varies greatly when the magnetic field intensity and orientation are varied. When the magnetic field was perpendicular to the collector-emitter axis, delay time increased several times. If a pulse duration is chosen which is shorter than the delay time at a certain value of magnetic field intensity, the punch-through state in the transistor may be turned on and off by varying the magnetic field. The orientation of the magnetic field had no marked effect on the values of diffusion-alloy transistors. Orig. art. has: 2 figures. [DW]

ASSOCIATION: none

SUBMITTED: 19Mar64 ENCL: 00 SUB CODE: EC

NO REF SOV: 000 OTHER: 003 ATD PRESS: 4061

Card 2/2 gik

ACC NR: AP6013520 UR/0120/66/000/002/0169/0173

AUTHOR: Goryunov, N.N.; Ovechkin, Yu.A.; Tolkacheva, Ya.A. Feoktistov, Yu.P.

ORG: None

TITLE: Observation of heat fields in semiconductor devices

SOURCE: Pribory i tekhnika eksperimenta, no.2, 1966, 169-173

TOPIC TAGS: transistor, transistor temperature, temperature sensing film, semiconductor device, heat sensing fluorescent film, fluorescent compound / K-9 fluorescent compound / FKP-03K fluorescent compound / FK-101 fluorescent compound

ABSTRACT: This paper describes a methodology for the exploration of thermal fields on the surface of semiconductor devices, based upon thermal effects on fluorescent films deposited upon the investigated surface. Attention to this method was directed in general by the connection between thermal field patterns and defects in semiconductor devices; and in a more specific way, by the drawbacks of high inertia of other feasible methods, such as e.g. evaporographs. The films used in the described method were dried deposits from ethyl alcohol suspensions, based upon ZnS with added activators. Compound K-9 and FK-101 decrease their brightness upon heating. Compound FKP-03K initially increases its brightness by a temporary flash. The apparatus for the exploration of temperature effects on fluorescence of the compounds consisted of a metal ribbon with the deposited compound on one side irradiated by ultraviolet light

Card 1/2 UDC: 539.293:536

ACC NR: AP6013520

and observed by a photomultiplier thru an ultraviolet-opaque filter. A heat source and a thermocouple riding upon the opposite side of the metal ribbon controlled the compound's temperature. It was found possible, using three compounds as required, to cover the temperature range of 20 - 250°C., and to attain adequate sensitivity - a doubling of luminosity for a 10°C temperature fall. With this method, the distributions of surface temperatures can be adequately evaluated quantitatively for the purposes at hand. Transistor and diode surface temperature patterns during overloads and breakdowns are shown. Characteristic hot spots appear e.g. upon the surface of a diode under conditions of an avalance breakthrough. Orig. art. has 8 figures.

SUB CODE: 20/ SUBM DATE: 03Mar65/ ORIG REF: 000/ OTH REF: 001

Card 2/2

1. GORYUNOV, N.P.

2. USSR (600)

4. Technology

7. (Electric meters). Moskva, Gosenergoizdat, 1951.

9. Monthly List of Russian Assessions, Library of Congress, November 1952, Unclassified.

COUNTRY : USSR
CATEGORY : Meadow Cultivation. L

ABS. JOUR. : RZhBiol., No. 3, 1959, No. 10834

AUTHOR : Gorynnov, N.
INST. :
TITLE : The Estuary Irrigation of Meadows and Pastures.

ORIG. PUB. : Nauka i peredov. opyt v s. kh., 1958, No. 6, 54-55

ABSTRACT : No abstract.

CARD: 1/1

GORYUNOV, N.S. [redacted] kand. tekhn. nauk.

Irrigation of pastures and meadows in Kazakhstan. Zemledelie 6 no.11:73-76 N '58. (MIRA 11:11)
(Kazakhstan--Pastures and meadows) (Irrigation)

GORYUNOV, N.S., kand.tekhn.nauk

Duration of flooding in basin snow-water irrigation. Dokl.Akad. sel'khoz. 24 no.6:41-43 '59. (MIRA 12:9)

1. Kazakhskiy institut vodnogo khozyaystva. Predstavlena akademikom I.A.Sharovym.

(Irrigation)

GORYUNOV, N.S., kand.tekhn.nauk (Alma-Ata)

Valuable book on the water economy of Kazakhstan (Water economy of Kazakhstan" by S.Daulenov, M.Zozulia. Reviewed by N.S.Goriunov). Gidr.i mel. 12 no.2:60-62 F '60. (MIRA 13:6)
(Kazakhstan--Water resources development)
(Daulenov, S.)
(Murashev, S.I.)

GORYUNOV, N.S.

Leaching salinized soils in the foothill zone of southern Kazakhstan. Pochvovedenie no.9:100-105 S '61. (MIRA 14:10)

1. Kazakhskiy nauchno-issledovatel'skiy institut vodnogo khozyaystva Akademii sel'skokhozyaystvennykh nauk.
(South Kazakhstan Province--Saline and alkali soils)

GORYUNOV, N.S., kand.tekhn.nauk; PETRUNIN, V.M. (g.Alma-Ata)

Irrigation regime of corn in southeastern Kazakhstan. Gidr. i mel. 13 no.6:3-12 Je '61. (MIRA 14:6)
(Kazakhstan--Corn (Maize)--Irrigation)

GORYUNOV, N.S.

"Irrigation farming" by S.S. Lysogorov. Reviewed by N.S. Goriunov. Zemledelie 23 no.3:93-94 Mr '61. (MIRA 14:3)

1. Zaveduyushchiy otdelom orosheniya Kazakhskogo instituta vodnogo khozyaystva.

(Irrigation farming)
(Lysogorov, S.D.)

VOROPAYEV, G.V., kand. tekhn. nauk (Alma-Ata); GORYUNOV, N.S., kand. tekhn. nauk (Alma-Ata)

Make fuller use of irrigation and water supply resources in the south of Kazakhstan. Gidr. i mel. 15 no.2:56-57 F '63. (MIRA 16:4)

(Kazakhstan—Irrigation farming)

GORYUNOV, N.S.; OGRYZKOVA, N.I.

Physiological appraisal of irrigation conditions for soybeans.
Fiziol. rast. 11 no.6:1090-1094 N-D '64.
(MIRA 18:2)

1. Kazakh Scientific Research Institute of Irrigation, Dzhambul.

GORYUNOV, N.S., kand.tekhn.nauk; PETRUNIN, V.M., inzh. (g.Dzhambul)

Corn irrigation in Kazakhstan. Gidr. i mel. 16 no.3:22-32
Mr '64. (MIRA 17:4)

GORYUNOV, N.S., kand. tekhn. nauk (Dzhambul); KVAN, R.A., inzh. (Dzhambul); DANIL'CHENKO, N.V., inzh. (Dzhambul)

Irrigation conditions of sugar beets in Kazakhstan. Gidr. i mel. 16 no.7:3-13 Jl '64. (MIRA 17:11)

GORYUNOV, N.S., kand.tekhn.nauk

Rice in Kzyl-Orda Province. Zemledelie 27 no.3:
39-42 Mr '65. (MIRA 19:1)

1. Kazakhskiy nauchno-issledovatel'skiy institut vodnogo khozyaystva.

VOLYNSKIY, S.L., inzh.; GORYUNOV, P.I., inzh.; ZELLER, Yu.G., inzh.; Kheyfets, S.I., inzh.

Redesigning the M-11 automatic oscillograph. Elek.sta. 29 no.11:85-86 N '58. (MIRA 11:12)
(Oscillograph)

GORYUNOV, P.I., inzh.; TSIMBEROV, L.D., inzh.

Improvement in the operation of the blocking system with KRB-121-type oscillations. Elek. sta. 31 no.12:79 D '60. (MIRA 14:5)
(Electric protection)

GORYUNOV, P.I., inzh.

Concerning the design of networks with RC circuits for slippage rate regulation. Elek.sta. 32 no.6:88-90 Je '61. (MIRA 14:8)
(Electric controllers)

VOLYNSKIY, S.L., inzh.; GORYUNOV, P.I., inzh.

Check of the DFZ-2 protection system on operating lines with a small load. Elek. sta. 33 no.5:91 My '62. (MIRA 15:7)
(Electric power distribution)
(Electric protection)

KOREN', G.G., inzh.; VOLYNSKIY, S.L., inzh.; GORYUNOV, P.I., inzh.

Faulty operation of a call-signaling system in DFZ-2 differential-phase high-frequency protection apparatus. Elek. sta. 33 no.8: 82-83 Ag '62. (MIRA 15:8)
(Electric power distribution) (Electric protection)

GORYUNOV, P. N.

Title: Electrical and magnetic measurements

Authors: V. O. Arutyunov, V. P. Valitskii, and P. N. Goryunov, under the editorial supervision of E. G. Shramkov

ONTI, 1937 M.-L.

From List ATIC 17413-3

GORYUNOV, P. N.

29656

Pogryeshnosti induktsionnykj Schyetchikov Pri ponizhygnnom Napryazhyenii. Elyektrichyestvo, 1949, No 9. s. 53-57

SO: LETOPIS' NO. 40

235T48

USSR/Electricity - Personalities Aug 52

"Professor L. R. Neyman: on His 50th Birthday," A. M. A. A. Gorev, P. N. Goryunov, I. A. Zaytsev, A. G. Zalesskiy, M. D. Kamenskiy, M. P. Kostenko, Ye. G. Lur'ye, M. M. Mikhaylov, M. A. Shatelen, Shramkov

"Elektrichestvo" No 8, pp 92, 93

Reviews Neyman's scientific, administrative, and educational work, and organizational affiliations. Specifies following as principal fields of his scientific activity: investigation of phenomena in nonlinear elec circuits with iron; special

235T48

problems of elec measurements; electromagnetic processes in converter installations for transmission of high-voltage dc power; and elec modeling of nonlinear processes in aerohydrodynamic systems.

235T48

GOPYYUNOV, P. N.

GORYUNOV, P. N.

Electrical Engineering Abstracts
May 1954
Instruments

Instruments

2010. Generalized theory of induction-type measuring instruments. V. O. ARUTYUNOV AND P. N. GORYUNOV. *Elektrichestvo*, 1953, *No.* 8, 24–8. *In Russian.*

The instruments are of either single-flux or multi-flux design and the authors show that a general theory of these instruments may be evolved from first principles and rigorously for the simple single-flux type with a metal disk. It is seen that the well-known physical facts on which the design of these instruments is based all follow from the relatively simple expressions derived from the electromechanical and energy equations. The theory of the multi-flux instruments, the only types in common use, presents no essential difficulties when evolved on the same lines. However, despite this clarification of the fundamental principles of this type of instruments (which also applies to induction-type relays), certain unavoidable constructional features of the actual instruments introduce slight complications which have to be considered in the design, e.g. the asymmetry of the pole arrangement. It is shown that not more than the introduction of additional conditions into the basic equations is required, these being satisfied by obvious modifications of certain terms of these equations, which does not alter the general character of these equations.

B. P. KRAUS

Leningrad Polytech Inst. im. Kalinin.

DR 8/13/54

GORYUNOV, P. N.

The Committee on Stalin Prizes (of the Council of Ministers USSR) in the fields of science and inventions announces that the following scientific works, popular scientific books, and textbooks have been submitted for competition for Stalin Prizes for the years 1952 and 1953. (Sovetskaya Kultura, Moscow, No. 22-40, 20 Feb - 3 Apr 1954)

Name	Title of Work	Nominated by
Goryunov, P. N. Pigin, S. M. Shumilovskiy, N.N.	"Electric Meters"	Ryazan' Radio Engineering Institute

SO: W-30604, 7 July 1954

Goryunov, P. N.

2

621.317.785

122. INDUCTANCE OF THE CURRENT CIRCUIT IN THE DISC OF AN INDUCTION INSTRUMENT. P.N.Goryunov and L.A.Kol'tsov.

Elektrichestvo, 1954, No. 8, 15-18. In Russian.

Existing theories often fail to take into account the inductance of the effective circuit in the disc, which may lead to an incorrect analysis of operation. Two approximate experimental methods for determining this inductance are given. The first considers the mechanical forces [illegible] between the flux and the induced current. These forces [illegible] except for an eccentric position of disc and pole. In the experimental investigation the forces were measured by a mech- [illegible] dynamometer. The [illegible] and absence of the disc [illegible] comparison of results of both methods [illegible] agreement. The motors [illegible] method of forces. However [illegible]

B F K A S

P.N.G.

GORYUNOV, P.N., kandidat tekhnicheskikh nauk; KOL'TSOV, A.A., inzhener.

Inductance of the current circuit in the disk of an induction device. Elektrichestvo no.8:15-18 Ag '56. (MLRA 9:10)

1.Ryazanskiy radiotekhnicheskiy institut.
(Calculating machines)

GORYUNOV, P. N.

SOV/112-58-1-719D

Translation from: Referativnyy zhurnal, Elektrotekhnika, 1958, Nr 1, p 107 (USSR)

AUTHOR: Goryunov, P. N.

TITLE: Theory, Calculation, and Investigation Methods of Induction-Type Electric Measuring Instruments (Teoriya, raschet i metody issledovaniya induktsionnykh elektroizmeritel'nykh priborov)

ABSTRACT: Bibliographic entry on the author's dissertation for the degree of Doctor of Technical Sciences, presented to Leningr. politekhn. in-t (Leningrad Polytechnic Institute), Leningrad, 1957.

ASSOCIATION: Leningr. politekhn. in-t (Leningrad Polytechnic Institute)

1. Electrical equipment 2. Instruments--Theory 3. Instruments --Analysis 4. Mathematics

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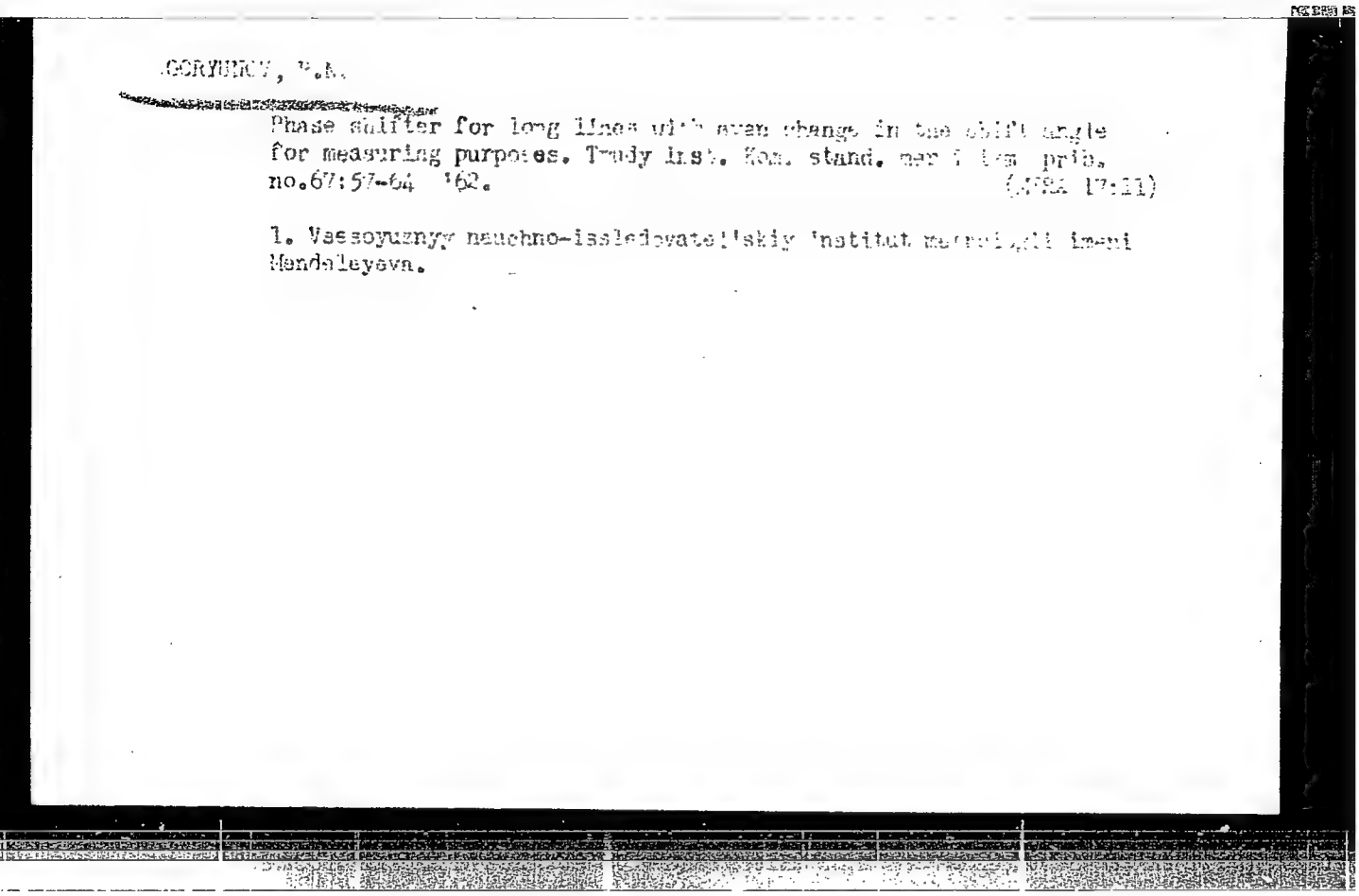

GORYUNOV, V.A.

Phase shifter for long lines with even change in the shift angle for measuring purposes. Trudy Inst. Kom. stand. mer i izm. prib. no.67:57-64 '62. (MIRA 17:11)

1. Vsesoyuznyy nauchno-issledovatel'skiy institut metrologii imeni Mendeleyeva.

ACCESSION NR AT3013128 S/2589/63/000/072/0073/0084

AUTHOR Goryunov, P. N.

TITLE New high-sensitivity ballistic method for testing ferromagnetic materials

SOURCE USSR. Komitet standartov, mer i izmeritel'ny*kh priborov. Trudy* institutov Komiteta, no. 72, 1963, 73-84

TOPIC TAGS magnetic testing, permeability measurement, permeammeter, ballistic method, multiplicative rectifying switch, ballistic galvanometer, vacuum galvanometer

ABSTRACT The method employs an ordinary ballistic galvanometer and its sensitivity can be increased by a factor more than 100 times over that of the known ballistic method. The method is based essentially on that developed by Ellwood (Rev. Sci. Instr. No. 5, 1934, p. 300) except that the special galvanometer used in the latter is replaced by an ordinary galvanometer used in conjunction with a special multiplicative-rectifying switch for reversal of magnetization. The operation of the equipment is described and an error analysis

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ACCESSION NR AT3013128

presented. The high sensitivity of the method permits its use for test of very small samples made of low permeability material in which the magnetic flux density may be as low as 0.1 microweber per square meter. Orig. art. has 16 figures, 9 formulas, and 4 tables.

ASSOCIATION VNIIM

SUBMITTED	23Jun62	DATE ACQ 28Oct63	ENCL 01
SUB CODE	MA, ML	NO REF SOV 001	OTHER 001

Card 2/2

GORYUNOV, P.N.

New highly sensitive ballistic method for testing ferromagnetic materials. Trudy inst.Kom.stand., mer i izm.prib. no.72:73-84 '63. (MIRA 16:9)

1. Vsesoyuznyy nauchno-issledovatel'skiy institut metrologii imeni Mendeleyeva.

(Magnetic materials—Testing)

GORYUNOV, S.I., kand.tekhn.nauk

Study of the underwater filling in of dumped rockfill with fine-grained sand. Gidr. stroi. 32 no.2:36-38 F '62. (MIRA 15:7)
(Dams) (Sand)

GORYUNOV, S. I.

DEMENT'YEV, M.A., professor, doktor tekhnicheskikh nauk; GORYUNOV, S. I., inzhener.

Calculating the pressures of seepage flow brought about in the soil by a hydraulic monitor jet. Izv. VNIIG no.40:73-88 '49. (MLRA 10:2)

(Jets) (Soil mechanics)

GOKYUNOV, S.I., kand.tekhn.nauk

Performance of suction dredges. Izv.VNIIG 48:217-221 '52.
(MIRA 12:5)

(Hydraulic machinery)

GORYUNOV, S.I., kandidat tekhnicheskikh nauk.

Hydraulic fill methods for ash heap protective dams made of fine ash. Elek.sta.28 no.1:39-40 Ja '57. (MLRA 10:3)
(Dams)

GORYUNOV, S.I., kand. tekhn. nauk.

Experimental investigation of the flow of three-phase mixtures under pressure. Elek. sta. 29 no.2:29-32 F '58. (MIRA 11:3)
(Fluid dynamics)

GORYUNOV, S.I., starshiy nauchnyy sotrudnik, kand.tekhn.nauk

Calculating the permissible intensity of hydraulic fill for coreless dams. Izv.VNIIG 61:43-59 '58.
(MIRA 13:6)

(Dams)

GORYUNOV, Semen Ivanovich; GIRSHKAN, I.A., red.

[Method for approximate calculation of hydraulic transportation of cohesionless soil under pressure] Sposob priblizhennogo rascheta napornogo gidrotransporta nesviaznykh gruntov. Izd.2. Moskva, Gos.energ.izd-vo, 1959. 42 p. (MIRA 13:3)
(Hydraulic engineering)

8 (6)

SOV/91-59-4-19/28

AUTHORS: Goryunov, S. I., Zadvornyy, G. M., Nagli, Ye. S., Engineers

TITLE: The Calculation of Ash and Slag Pipelines
(O raschëte zoloshlakoprovodov)

PERIODICAL: Energetik, 1959, Nr 4, pp 26 - 29 (USSR)

ABSTRACT: In the power plants of the USSR, ash and slag are transported to the ash dumps by hydraulic devices and pipelines, for example with the Moskal'kov hydraulic apparatus or by dredger pumps. In 1956, VNIIG began an investigation of existing hydraulic ash removal systems on an experimental installation for obtaining the theoretical grounds for calculating pressure lines for ash and slag removal. For this purpose, the hydraulic ash and slag removal systems of the Chelyabinsk and Voronezh power plants were investigated. Dredger pump systems were tested at the Shterov GES. The data of these investigations were used for building an experimental installation using the Moskal'kov hydraulic equipment reduced to one third its actual size. The experimental data were compared with the data obtained from full-scale ash removal

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The Calculation of Ash and Slag Pipelines

installations. Figure 1 shows a graphic representation of this comparison. The authors present formulas for calculating ash and slag pipelines and recommend speeds at which ash and/or slag should be transported. Slag alone may be transported at speeds of 1.8 - 2.2 m/sec, slag and ash 1.6-1.9 m/sec and ash alone 1.2-1.4 m/sec.
There are 2 graphs and 2 tables.

GORYUNOV, S.I., starshiy nauchnyy sotrudnik, kand.tekhn.nauk

"Energy interpretation of the concept of pressure in a liquid." (MIRA 14:5)
Izv.VNIIG 63:243-245 '60.
(Hydraulics)

GORYUNOV, S.M.

Analytical solution of the planning problem of the flow of ground waters from reservoirs bypassing water outlets. Izv.AN Uz.SSR.Ser. tekh.nauk 9 no.5:71-74 '65. (MIRA 18:10)

1. Sredneaziatskiy nauchno-issledovatel'skiy institut vodnykh problem i gidrotekhniki.

AMMOSOV, I.I., red.; BURTSEV, D.N., red.; GORYUNOV, S.V., red.; GUSEV, A.I., red.; KOROTKOV, G.V., red.; KOTLUKOV, V.A., red.; KUZNETSOV, I.A., red.; MIRONOV, K.V., red.; MOLCHANOV, I.I., red.; NEKIPELOV, V.Ye., red.; PONOMAREV, T.N., red.; POPOV, V.P., red.; PROKHOROV, S.P., red; SKROBOV, S.A., red.; TYZHNOV, A.V., red.; SHABAROV, N.V., red.; YAVORSKIY, V.I., red.; BOBRYSHEV, A.T., red. toma; VINOGRADOV, B.G., red. toma; VOLKOV, K.Yu., zam. red. toma; LUGOVOY, G.I., zam. red. toma; OGARKOV, V.S., red. toma; SIMONOV, A.V., red. toma; IZRAILEVA, G.A., red.izd-va; IVANOVA, A.G., tekhn. red.

[Geology of coal and combustible shale deposits in the U.S.S.R.]Geologiia mestorozhdenii uglia i goriuchikh slantsev SSSR. Glav.red.I.I.Ammosov i dr. Moskva, Gosgeoltekhizdat. Vol.2. [Moscow Basin and other coal deposits in central and eastern provinces of the European part of the U.S.S.R.]Podmoskovnyi bassein i drugie mestorozhdeniia uglia tsentral'nykh i vostochnykh oblastei Evropeiskoi chasti RSFSR. 1962. 569 p. maps. (MIRA 15:9)

1. Russia (1923- U.S.S.R.)Ministerstvo geologii i okhrany nedr.

(Coal geology)

GORYUNOV, V.; KAPELINSKIY, Yu.

International division of labor and economic collaboration of socialist countries. Sots.trud no.10:73-83 O '57. (MIRA 10:11)
(Division of labor) (International economic relations)

VOROB'YEV, N.; KOVROVA,P., doyarka, dvazhdy Geroy Sotsialisticheskogo Truda, deputat Verkhovnogo Soveta RSFSR; KONYAYEV, I.; GORYUNOV, V.

Lights on the banks of the Oka. Sov.profsoiuzy 6 no.8:49-52 Jl '58. (MIRA 11:9)

1.Shilovskiy raykom profsoyuza rabotnikov kul'tury (for Vorob'yev).
2.Profgruporg traktornoy brigady kolkhoza imeni Kalinina (for Konyayev).
(Ryazan Province--Social group work)

GORYUNOV, V.

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(Coal mines and mining--Equipment and supplies)

GORYUNOV, V.

Work of the Trade Committee of the United Nations Economic Commission for Asia and the Far East. Vnesh.torg 30 no.5: 26-30 '60. (MIRA 13:5)
(United Nations--Commissions) (Commerce)